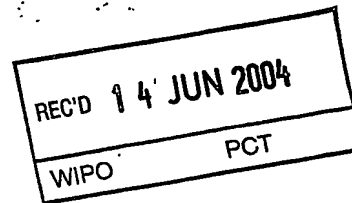




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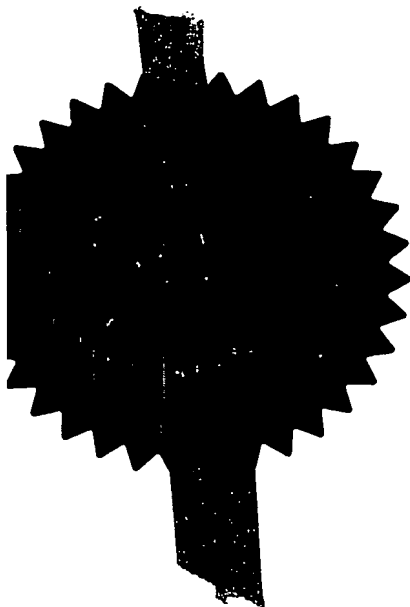
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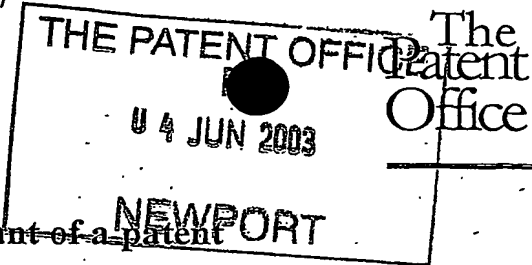
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1/77

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The Patent Office

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2.	Patent application number (The Patent Office will fill in this part)	0312791.7 P01/7700 0.00-0312791.7		
3.	Full name, address and postcode of the or of each applicant (underline all surnames)	LOADHOG LIMITED THE OLD WEST GUN WORKS SAVILE STREET EAST SHEFFIELD S4 7UQ		
	Patents ADP number (if you know it)	8548372001		
	If the applicant is a corporate body, give the country/state of its incorporation	ENGLAND		
4.	Title of the invention	A CAP FOR PALLETISED LOADS		
5.	Name of your agent (if you have one)	Hulse & Co		
	"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	St James House, 8 <sup>th</sup> Floor Vicar Lane Sheffield S1 2EX		
	Patents ADP number (if you know it)	885002		
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day/month/year)
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Description 8

Claim(s)

Abstract

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Priority documents

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Statement of Inventorship and right to grant of a patent (*Patents Form 7/77*) 6

Request for preliminary examination and search (*Patents Form 9/99*)

Request for substantive examination (*Patents Form 10/77*)

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11.

I/We request the grant of patent on the basis of this application.

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Date



3 June 2003

AS AGENTS FOR THE APPLICANT

12. Name and daytime telephone number of person to contact in the United Kingdom

T. A. HULSE

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## A CAP FOR PALLETISED LOADS

This invention relates to a cap for use on palletised loads, more particularly the type of cap having at least two strapping strands retractable into housings through openings at opposite sides (at least) of the cap, spring means within the housings for retracting the strapping strands, hooks on the free ends of the strapping strands for engagement with the underside of the platform of a pallet (e.g. a 4-way pallet), tensioning means within the housings for tightening the strapping strands between the caps and the pallet after interposing a load between the cap and the pallet, and stop means for limiting retraction of the hooks into the housings when not engaged with a pallet.

Such a cap can be used without need to modify existing pallets, particularly - but not exclusively - those made of wood. The preferred form of hook has two prongs spaced apart so as to fit one to each side of a middle spacer of a pallet, without being in danger of damage or dislodgement by the forks of a fork-lift truck.

-Two such caps are to be found in WO-A-01/96203.

In one of those caps each strapping strand is a wire or non-metallic rope retractably wound spirally on a 'thin' reel within the respective housing and having a short cylindrical core between annular flanges spaced apart by negligibly more than the overall diameter of the rope, so that the rope will be wound spirally on the core, the axis

of the reel being perpendicular to the general plane of the cap, the core being on a shaft rotatably mounted within the housing, there also being provided a rewind spring coiled round the shaft alongside the reel, stop means limiting the extent to which the hook can be drawn into the housing by the action of the rewind spring, a ratchet concentric with the reel and rotatable with the reel and shaft, with a pawl for engaging

teeth on the ratchet to stop or prevent pulling of the rope from the reel, and manually-operable means for tensioning the rope when the pawl has been engaged with a tooth on the ratchet, particularly characterised in that each tooth of the ratchet has a pawl-engageable face inclined forwardly from its radially inner end with respect to a radial line from the axis of the shaft through said radially inner end of said face and with respect to the direction of unwinding of the rope from the reel, the pawl has a complementary face for mutual engagement with said face of any one tooth of the ratchet, the pawl is provided with spring-loading means with manually-operable means for changing the effect of the spring loading over between urging the pawl into engagement with the ratchet and towards a position holding the pawl clear of the ratchet, and in that the manually-operable tensioning means is by way of a separate wrench engageable with one end of the shaft. While a separate wrench can have such a length of handle as to enable adequate tension to be applied to each wire or rope, application of the wrench to the cap when placed on a load of a height of, say, two metres is very difficult, even for a person of above average height. Likewise, access to the manually-operable change-over means for the ratchet is very difficult, especially as the change-over cannot be effected without use of the wrench for slight additional tensioning of the wire or rope to free the pawl from the ratchet.

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~~In the other cap each strapping strand is a strap, there being within the~~

respective housing parallel guides between ends of the housing, at one end of which is the opening; a crosshead slidable along the guides towards and away from the opening, the crosshead being mainly constituted by crossbars of graduated diameters; a fixed array of graduated crossbars adjacent the opposite end of the housing from the crosshead, the axes of the crossbars in the crosshead and the fixed array all being in

a common plane with the smallest diameter crossbars being the nearest to each other, the strap having its inner end secured to one of the smallest diameter crossbars and being lapped in multi-purchase array round the other smallest diameter crossbar and each successively greater diameter crossbar in the crosshead and fixed array in turn, and with the final lap of the strap emerging from the opening in the housing, and spring means to urge the crosshead away from the fixed array; the total length of strap that can be accommodated being principally dependent on the number and lengths of laps between the crosshead and the fixed array, and the number of laps being determined by the number of crossbars in the crosshead and in the fixed array (e.g. three crossbars in one and two in the other giving five laps), the diameters of the crossbars can be but a few millimetres each consistent with being strong enough to carry the loads in the strap generated by the spring means, the tensioning means being a lever with an over-centre locking action rotating a slotted crossbar through which the strap passes. The length of the lever and the extent to which it can rotate the slotted crossbar are so limited that adequate tension in the straps is difficult to achieve, especially in view of elasticity/stretchability of the straps.

Therefore, the object of the present invention is to provide a cap for palletised loads with which adequate tension can be applied to the strapping strands by means accessible at all times from the sides of the cap.

According to the present invention, a cap of the type initially defined has each tensioning means comprising a slotted crossbar through which the strapping strand passes, a lever movable in a plane parallel to the general plane of the cap between operative and inoperative positions within the respective side of the cap, linkage provided between the lever and the slotted crossbar such that movement of the lever

from inoperative position to operative position causes rotation of the slotted crossbar, to wind the strapping strand round the slotted crossbar, thus enabling tension to be developed in the strapping strand after its hook has been engaged with a pallet, and manually releasable spring-loaded latch means provided on the lever for securing the strap in tension; which latch means may also secure the lever in inoperative position. Thus the lever is accessible from the respective side of the cap regardless of the height at which the cap is disposed on a load on a pallet; and there need be no openings on top of the cap allowing ready ingress of water or dirt to the mechanism or through to the load.

The axis of rotation of the slotted crossbar may be at the middle of the slot or offset therefrom. The slotted crossbar may be formed by a pair of parallel bars rigidly connected at both ends, and the axis of rotation may be at the middle of one of the bars, whereby the other bar orbits round it.

The extent of rotation of the slotted crossbar, and hence the tension in the strapping strand, may be determined by the mechanical advantage of the lever and the form of linkage between the lever and the slotted crossbar. Thus the linkage may comprise at least one wire or cable (hereinafter referred to simply as wire) secured at one end to the lever and secured at the other end to a pulley secured for rotation with the slotted crossbar, movement of the lever from inoperative position to operative

position effecting unwinding of the wire from the pulley to cause winding of the strapping strand round the slotted crossbar, the ratio of the diameter of the pulley to the crossbar thus also affording a high mechanical advantage capable of developing high tension in the wire (and hence in the strapping strand after its hook has been engaged with a pallet), with a spring return for re-winding the wire onto the pulley when the lever

is moved to effect release of tension in the wire. The wire (or cable) may be formed of metal or of any other substantially inelastic/non-extensible material.

A ratchet mechanism is preferably incorporated in the linkage between the lever and the slotted crossbar, to enable repeated swinging of the lever to-and-fro to effect as many turns of the strapping strand round the slotted crossbar as may be needed for adequate tensioning of the strapping strand. Thus there may be provided a spool rotatable about a fixed common axis with the lever, with the first-mentioned wire end reeved to the spool, the lever being rotatably mounted with respect to the spool, at least one ratchet secured for rotation with the spool, a ratchet drive plate slidably mounted on the lever, a first spring urging the drive plate into engagement with the ratchet, a latching plate slidably mounted in the housing, a second spring urging the latching plate into engagement with the ratchet to latch the ratchet at times when it is not being rotated by driving action of the lever through the drive plate, the drive plate being manually operable against the first spring to disengage it from the ratchet, a cam on the lever for disengaging the latching plate from the ratchet after the drive plate has encountered and rides along a fixed radius plate in the housing to hold the drive plate clear of the ratchet; whereby tension in the wire is released and it is rewound onto the pulley and at the same time unwinding the strapping strand from the slotted crossbar until the strapping strand is free to be retracted through the crossbar upon

disengagement of the hook from the platform of a pallet.

The ratchet preferably extends the full length of the spool and the lever is bifurcated, with the spool disposed between the two arms of the lever and the drive plate for engaging the ratchet guided in slots in the arms of the lever, and with a circumferential groove in the spool into which the wire can be wound.



Each strapping strand is preferably a strap having its end remote from the hook secured to the barrel of a drum on an axis perpendicular to the general plane of the cap, with a spring within the drum for retracting the strap when it is free to run through the slotted crossbar, and the strap twists through 90° between the drum and the slotted crossbar. Thus each housing need have a depth little more than the height of the drum, which preferably has thin flanges at the ends of its barrel, enabling the housings to be formed between upper and lower portions of the cap, from one of which portions depends a skirt, which is preferably stepped outwardly from side portions of the cap to enable like caps to be nested with each other and/or with pallets during return transporting as well as to help secure a load on a pallet by embracing the top sides of the load.

Each opening is preferably provided at the back of a recess in the respective side of the cap of a depth front-to-back to receive fully the respective hook, and the bottom of the recess provided with ramping surfaces to effect automatic parking of the hook into the recess upon retraction of the strap into the housing and retraction of the hook against dislodgement when the cap is turned over; and the lever is located within a slot in the respective side of the cap extending from the recess.

While two strapping strands may suffice for use with a 2-way pallet or a 4-way pallet, a cap according to the present invention may have four strapping strands

especially for use with a 4-way pallet but capable of being used with a 2-way pallet by utilising only two opposite strapping strands.

Each lever or spool may incorporate a torque limiting device to ensure that a load secured on a pallet by the cap is loaded adequately by the cap and/or not overloaded.

The bulk of the cap is conveniently formed of plastics material, with a main moulding forming the lower portion of the housings, the sides and the skirt, and individual smaller mouldings forming covers over the mechanism areas, with integral formations on the upperside of the lower portion and on the undersides of the individual mouldings forming bearings and other locations for the levers, spools, slotted crossbars and pulleys, and the drums, and also the sides of the recesses and the ramping formations therein.

The centre of the main moulding may be provided with an opening spanned by a bar handle, to facilitate manual handling of the cap, particularly onto and off loads on pallets, by one hand of an operator, the central opening preferably being formed by a recess, to prevent water or dirt entering the space between the mouldings occupied by the strapping mechanisms; and one or more handholds may be provided at each side of the cap, e.g. adjacent each corner, to allow the other hand of an operator to steady or control manipulative movement of the cap, e.g. a slot in each side of the skirt adjacent the corners; or the skirt round all sides of the cap may suffice as a handhold anywhere convenient.

Furthermore, to suit different widths on middle spacers in pallets, e.g., standard wooden pallets, euro pallets and specific user pallets, different sizes of hook may be made available with different spacings between the prongs, for location closely to each side of the respective width spacer, each prong being cranked out from a mid-portion of the hook of a width commensurate with the width of the strap secured around it. Alternatively, a single size of hook may be provided with a spacing between the hooks for location closely to each side of the widest middle spacer in use. Each hook is preferably provided with a bracing bar parallel to the mid-portion to aid withdrawal of

the hook from its recess by hand and placement onto a pallet by the toe of footwear.

The bracing bar position (i.e. distance from the mid-portion) can be utilised to modify the springiness of the hook, which springiness helps dampen out vibrational forces during transit, and elasticity of the strap may have a similar beneficial effect.

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